

ABSTRACT

A process of stably forming an ultrafine crystal layer in a surface of a metal product at a low cost. A hole 1 is formed in a workpiece W by a drill D, whereby a large strain is imparted to an inner circumferential surface of the formed hole 1, so as to form the nanocrystal layer C2 in the inner circumferential surface. In this instance, the inner circumferential surface of the hole 1 is subjected to a plastic working causing a true strain of at least 1 in the inner circumferential surface, and a temperature at the machined surface is held in a range which is not lower than its Ac1 transformation point and is lower than its melting point. Alternatively, the temperature is held at a value not higher than its Ac1 transformation point. In such a way, the nanocrystal layer C2 can be stably formed in the inner surface of the hole 1 at a low cost.